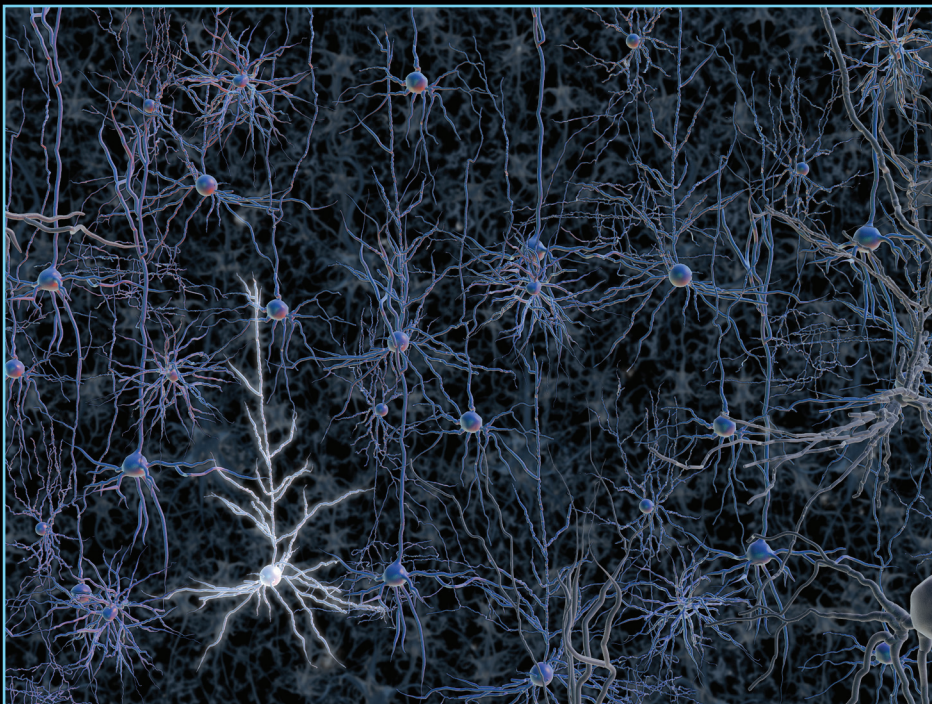


# UNDERSTANDING — THE — BRAIN

## The National Science Foundation's role in the BRAIN Initiative



### ***What is the BRAIN Initiative?***

- The Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Initiative, [announced in April 2013 by the White House](#) will support and coordinate research on how the brain functions over an organism's lifespan.
- This multiagency Initiative is led by NSF along with the National Institutes of Health (NIH) and the Defense Advanced Research Projects Agency (DARPA) and includes private partners. It holds great promise for addressing fundamental questions about healthy brain function, advancing treatments for brain disorders or traumatic brain injury, and for generating brain-inspired "smart" technologies to meet our future needs as a society.
- The BRAIN Initiative is intended to accelerate the development of experimental and theoretical approaches and novel neurotechnologies essential for understanding the dynamics and principles of brain structure and function.

### ***What is NSF's role in the BRAIN Initiative?***

- [NSF is uniquely positioned](#) to lead a transdisciplinary effort to foster innovative brain research by bringing together a wide range of scientific and engineering disciplines. Working together, these disciplines will address brain-mapping and bridge scales that span from synapses to behavior.
- NSF supports all fields of fundamental science and engineering, and invests in high-risk, high-impact exploratory and transformational scientific and engineering research.
- In its long history of supporting brain science, NSF has produced transformational breakthroughs in [brain imaging](#), [neurotechnologies](#), [modeling](#) and [genomics](#).

### ***How much funding is NSF devoting to BRAIN?***

- President Obama announced the BRAIN Initiative will commit \$100 million in FY 2014, including \$20 million from NSF. This contribution represents ongoing investments that NSF is already devoting to research related to BRAIN Initiative goals, as part of overall ongoing funding for research in neuroscience and cognitive science.
- NSF and other participating agencies are also proposing additional funds for these investment areas in FY 2014. Funding for the BRAIN Initiative depends on many factors, including Congressional decisions on the federal budget.

### ***How is NSF preparing for BRAIN-related investments?***

- NSF has quickly gathered input from relevant scientific communities on priority research areas related to the BRAIN Initiative.
- NSF has supported the following planning and prioritization workshops across various disciplines and thematic areas that are related to the BRAIN Initiative:
  - *Phylogenetic Principles of Brain Structure and Function*, October 2013. Sponsored by the NSF Directorate of Biological Sciences and Howard Hughes Medical Institute Janelia Farm Research Campus.
  - *Mapping and Engineering the Brain*, August 2013. Sponsored by the NSF Directorate for Engineering. Report: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6615987>
  - *Integrating Approaches to Computational Cognition*, May 2013. Sponsored by the following NSF Directorates: Social, Behavioral, and Economic Sciences; Computer and Information Science and Engineering. Report: <http://matt.colorado.edu/compcogworkshop/report.pdf>

- *Linking Language and Cognition to Neuroscience via Computation*, May 2013. Sponsored by the following NSF Directorates: Social, Behavioral, and Economic Sciences; Computer and Information Science and Engineering. Report: [http://www.psych.nyu.edu/clash/dp\\_papers/NSF-Workshop-report.pdf](http://www.psych.nyu.edu/clash/dp_papers/NSF-Workshop-report.pdf)
- *Physical and Mathematical Principles of Brain Structure and Function*, May 2013. Sponsored by the following NSF Directorates: Mathematical and Physical Sciences; and Biological Sciences. Website: <http://physicsoflivingsystems.org/brainstructureandfunction/>
- Also, in September 2013, NSF launched a new Science and Technology Center, [Center for Brains, Minds and Machines](#), at MIT devoted to developing a fundamental understanding of intelligence and its neural and computational underpinnings.

#### **What BRAIN-related research areas are among NSF's priorities?**

- NSF's investments in the BRAIN Initiative emphasize integration across scales and disciplines to establish quantitative and predictive theories of brain structure and function, and the use of these theories to help maintain and restore the healthy brain.
- Areas of interest include:
  - Quantitative and predictive theories of brain function.
  - Innovative technologies to understand and enhance brain function or treat brain disorders.
  - Development of cyber tools and standards for data acquisition, analysis and integration.
  - Multi-scale and multimodal modeling to relate dynamic brain activity to cognition and behavior.
  - Comparative analyses across species.

#### **How does my brain research fit within NSF's interests?**

- All NSF Directorates address brain-related research:
  - Biological Sciences
  - Computer & Information Science & Engineering
  - Education & Human Resources
  - Engineering
  - Geosciences
  - International & Integrative Activities
  - Mathematical & Physical Sciences
  - Social, Behavioral & Economic Sciences
- To date, NSF funds research under the BRAIN Initiative via its existing funding mechanisms, which are flexible and accommodate evolving research priorities.

- NSF's funding mechanisms include:
  - Directorates' core programs that address topics on brain research, which are described at [NSF.gov](#)
  - [Early-concept Grants for Exploratory Research](#) (EAGERs), which support exploratory work in its early stages on untested, but potentially transformative, research ideas or approaches.
  - Science and Technology Centers, where world-class research is conducted through partnerships among academic institutions, national laboratories, industrial organizations.
  - [Research Coordination Networks](#) (RCN), which provide opportunities to foster new collaborations, including international partnerships, and address interdisciplinary and transdisciplinary topics. Innovative ideas for implementing novel networking strategies, collaborative technologies, and the development of community standards for data and meta-data are especially encouraged.
  - Ideas Labs, which are designed to address targeted problems and create innovative solutions. Participants in an Ideas Lab, selected through an open application process, engage in an intensive residential workshop, the development of multidisciplinary collaborative proposals through a real-time and iterative review process, and, for the participant teams invited to submit full proposals, the subsequent submission of full proposals.
  - [Collaborative Research in Computational Neuroscience](#) (CRCNS): This interagency competition jointly administered by NSF, NIH and the German Federal Ministry of Education and Research supports collaborative activities that advance the understanding of nervous system structure and function, and mechanisms underlying nervous system disorders, through the identification of computational strategies used by the nervous system.
- Learn more about NSF's funding mechanisms for brain research at [NSF.gov](#). Discuss how your research fits with these funding mechanisms with an NSF program director.



National Science Foundation